BOSE THE UNSUNG GENIUS

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BriBooks

PREFACE

Human civilization have seen several people who have changed the course of history and influenced their sphere of living by their intelligence and talent. Be it geographical expansion art and entertainment, science and technology, literature, politics, sportsmanship or sports, these exceptional and legendary individuals have created history and everlasting significance.

This series of biography summarizes the life of one of these exceptional role models.

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CHILDHOOD

Satyendra Nath Bose was born on 1 January 1894 at Bengal on a place called Bara Jagulia, by Surendra Bose and Amodini Raichaudhuri. He was the eldest of children of which there were 6 sisters and Bose being the only brother.

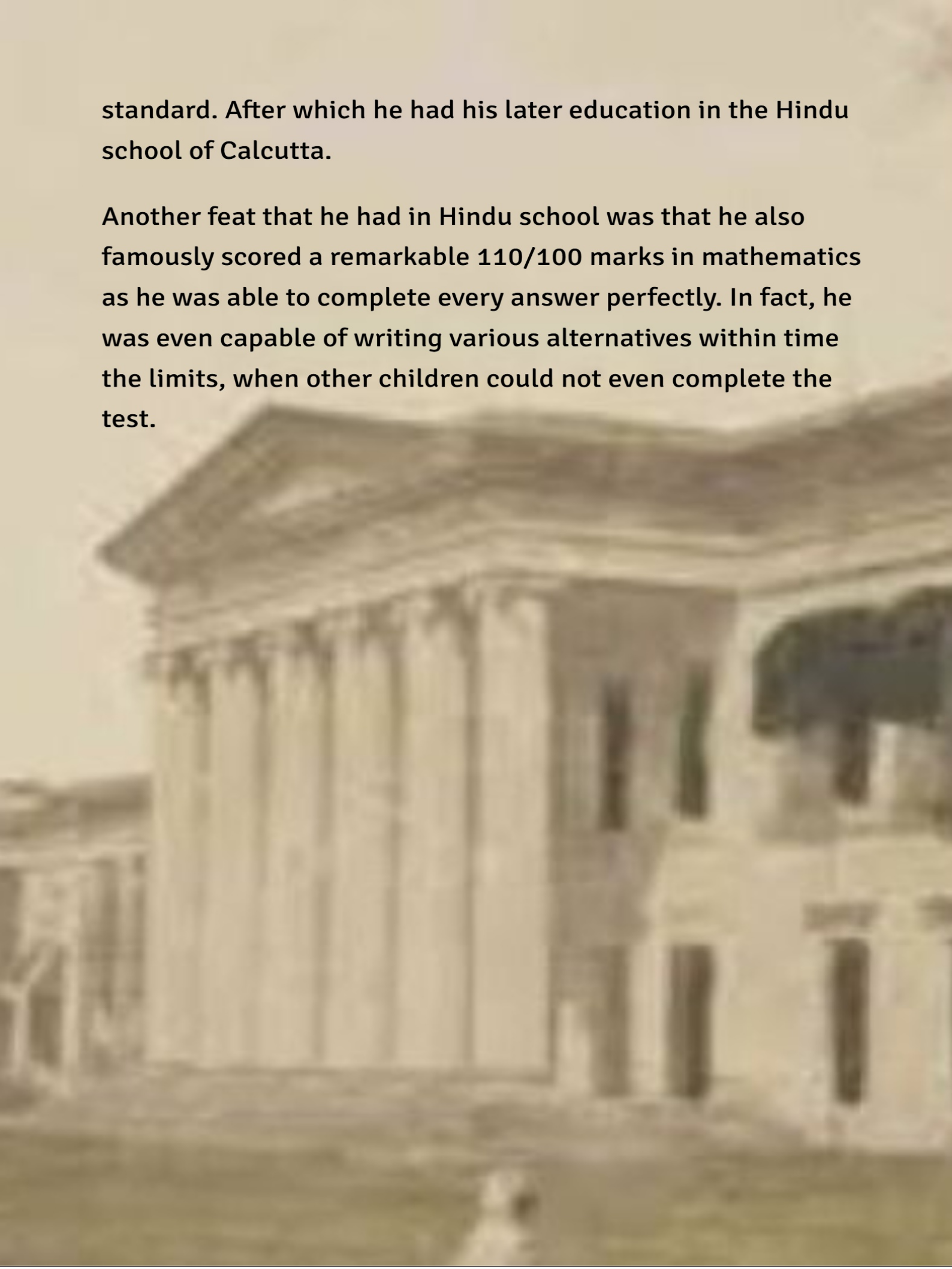
His father, Surendranath Bose, was an accountant in the East Indian Railway, Earning just enough to provide his whole

His mother, Amalabala Devi came from a respected Bengali family and was known for her grace, discipline, and nurturing spirit. Alamabala Devi is one of the biggest reasons for Satyen's calm Demeanour.

Historically it is said that Bose's father used write a problem on floor every day before going to work, he always found the answer written on floor along with alternate ways to solve it. He studied in New Indian School in Calcutta till 5th

standard. After which he had his later education in the Hindu school of Calcutta.

Another feat that he had in Hindu school was that he also famously scored a remarkable 110/100 marks in mathematics as he was able to complete every answer perfectly. In fact, he was even capable of writing various alternatives within time the limits, when other children could not even complete the test.

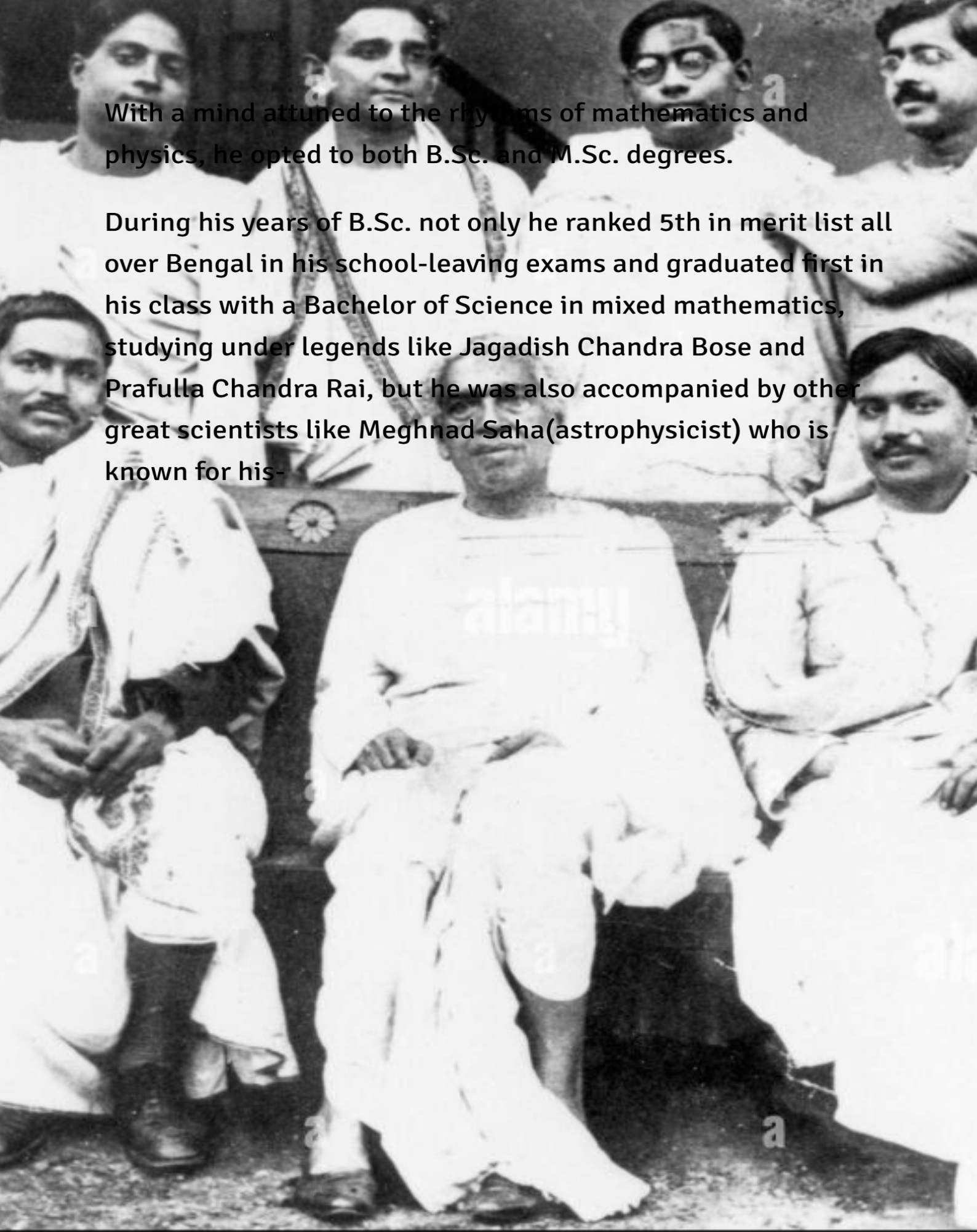


Where other students could not even accomplish the level of maths of their own classes Satyendra Bose even started to understand and practice advance level maths by borrowing the books of college level maths from the library of their school.

He always scored the highest marks while taking interest in maths, science and languages like Bengali, English, Sanskrit, and even foreign languages like German and French.

COLLEGE LIFE

Bose joined Presidency College (one of the greatest college in India at the time) in 1909, after ranking fifth in his matriculation exam. He pursued a B.Sc. in mathematics, followed by an M.Sc. in mixed mathematics, which he completed in 1915, topping every exam he took. With a mind attuned to the rhythms of mathematics and physics, he opted for both B.Sc. and M.Sc. degrees.



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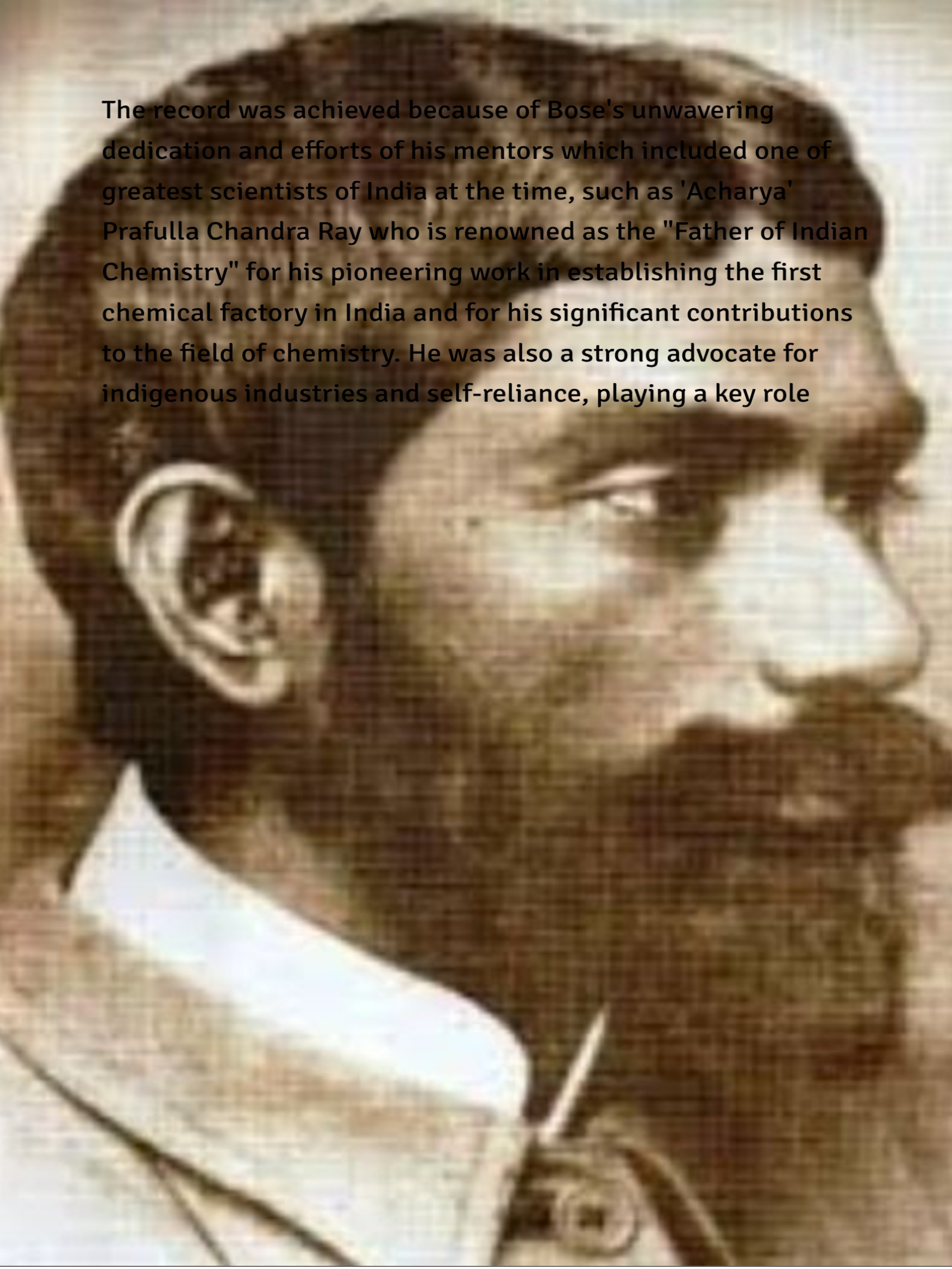
During his years of B.Sc. not only he ranked 5th in merit list all over Bengal in his school-leaving exams and graduated first in his class with a Bachelor of Science in mixed mathematics, studying under legends like Jagadish Chandra Bose and Prafulla Chandra Rai, but he was also accompanied by other great scientists like Meghnad Saha(astrophysicist) who is known for his-

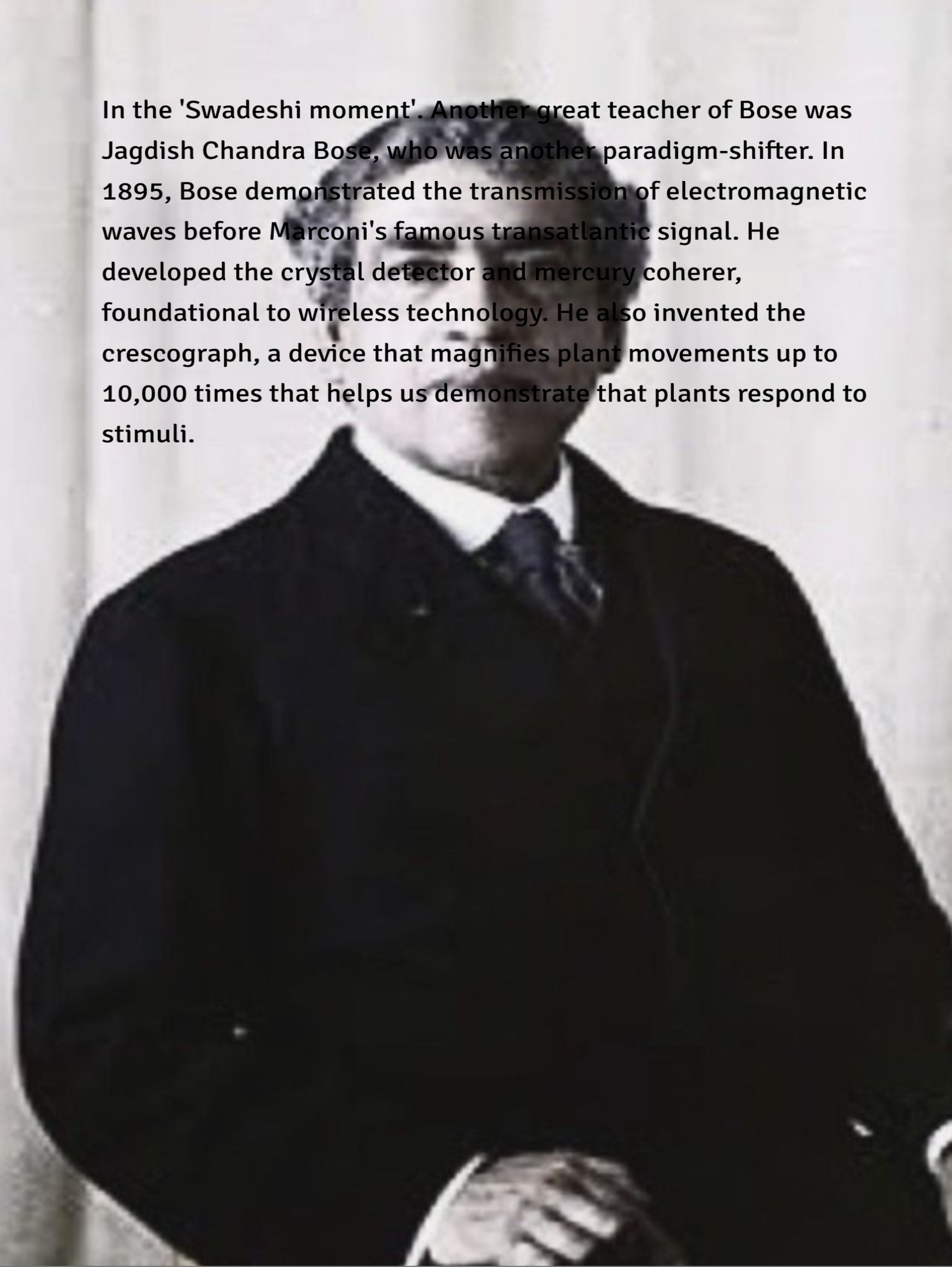
Saha Ionization Equation, alongside J.C. Ghosh (chemist) known for introducing Fischer-Tropsch Reaction, and J.N. Mukherjee (botanist) known for his Electrokinetic Double Layer Theory and for being the director of Indian Agricultural Research Institute (IARI). They helped Bose in his studies and were also helped thanks to their company with Satyen. He and his friend Saha often studied advanced topics outside the curriculum, including Einstein's theory of relativity, which was still new and barely taught in India.

Which later helped him to Bose and Saha translated Einstein's papers into English while still undergraduates making cutting-edge science accessible to Indian scholars.

Not only during B.Sc. but, even during his M.Sc. years in the well known Calcutta University Bose, he was brilliant in studies and not only he topped the whole university in 1915 but even left a luminous stain on the canvas of scholarship that was according to the data collected by university itself never broken.

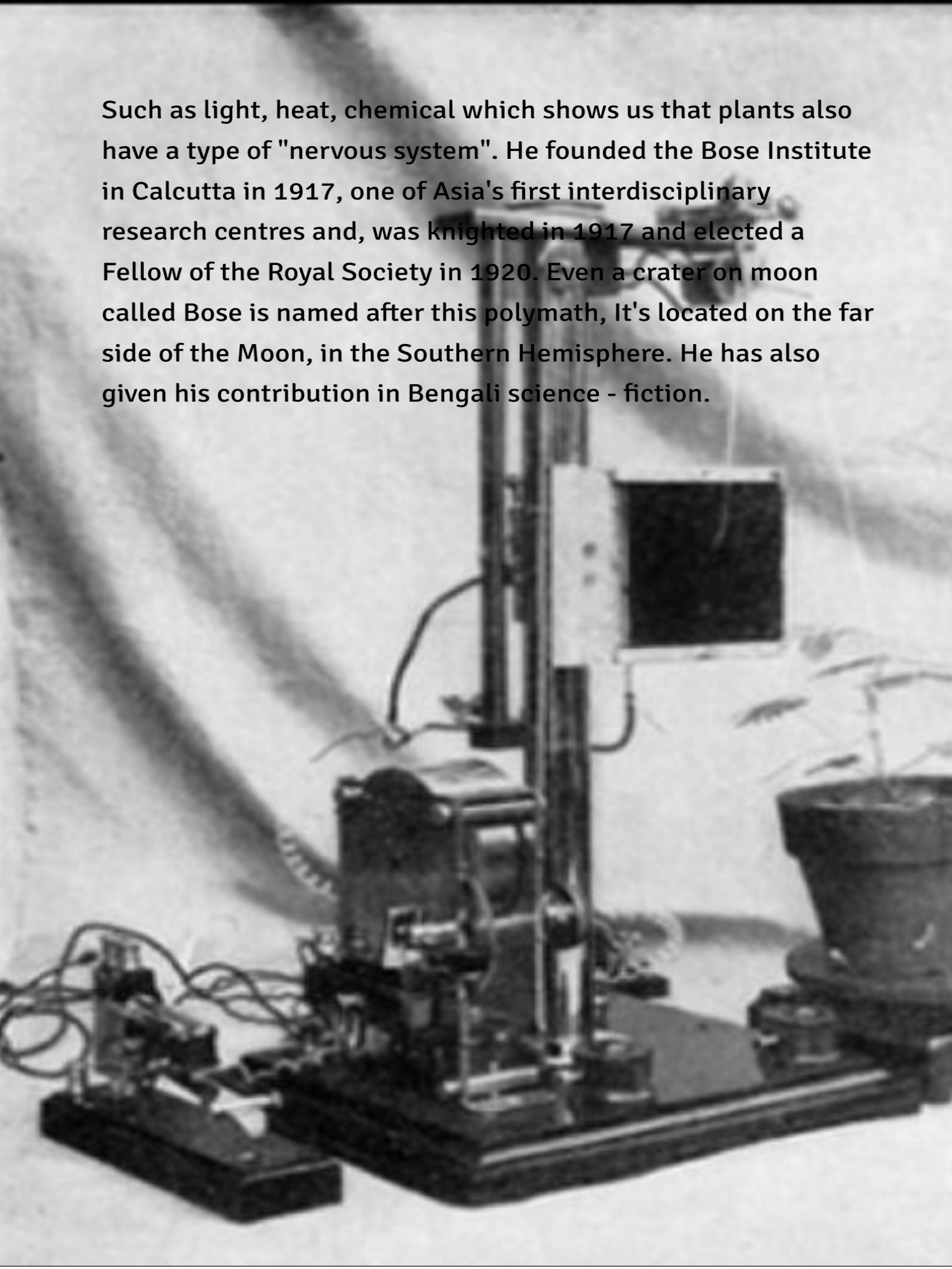


The record was achieved because of Bose's unwavering dedication and efforts of his mentors which included one of greatest scientists of India at the time, such as 'Acharya' Prafulla Chandra Ray who is renowned as the "Father of Indian Chemistry" for his pioneering work in establishing the first chemical factory in India and for his significant contributions to the field of chemistry. He was also a strong advocate for indigenous industries and self-reliance, playing a key role



In the 'Swadeshi moment'. Another great teacher of Bose was Jagdish Chandra Bose, who was another paradigm-shifter. In 1895, Bose demonstrated the transmission of electromagnetic waves before Marconi's famous transatlantic signal. He developed the crystal detector and mercury coherer, foundational to wireless technology. He also invented the crescograph, a device that magnifies plant movements up to 10,000 times that helps us demonstrate that plants respond to stimuli.

Such as light, heat, chemical which shows us that plants also have a type of "nervous system". He founded the Bose Institute in Calcutta in 1917, one of Asia's first interdisciplinary research centres and, was knighted in 1917 and elected a Fellow of the Royal Society in 1920. Even a crater on moon called Bose is named after this polymath, It's located on the far side of the Moon, in the Southern Hemisphere. He has also given his contribution in Bengali science - fiction.



And therefore is also known as the father of Bengali science fiction. He has written several great books such as " Niruddusher Kahini" (the story of the missing one) and is historically known as the first story of science fiction written in Bengali and so, was published in a magazine called the Bangadarshan.

DISCOVERIES

He made several discoveries such as Bose - Einstein condensates, Bose - Einstein Statics (BEC), Photon Gas Concept etc.

He made the discovery of Bose - Einstein Satics (BEC), when he sent a research paper on quantum statics to Einstein on June 1924. He was deeply impressed to read the papers written by a scientist who was relatively unknown at the time. He himself translated the paper in German and

Submitted it to Zeitschrift fur Physik which was the leading physics journal at the time, which was a rare gesture from Einstein, showing his personal endorsement. Though Bose's research dealt only with photons Einstein took great interest and further applied the same laws and statistical method to atoms, particularly ideal gases made of bosons. Which eventually led to the prediction of Bose -Einstein Condensation a new state of matter where particles collapse into a single quantum state at ultra - low temperatures.

ZEITSCHRIFT FÜR

PHYSIK

VON

KARL SCHEEL

DREIUNDDREISSIGSTER BAND

Mit 256 Textfiguren

(Ausgegeben Juli — September 1925)

VERLAG VON JULIUS SPRINGER, BERLIN

Later in 1995 Physicists Eric Cornell and Carl Wieman at the University of Colorado successfully cooled a gas of rubidium-87 atoms to just 170 nanokelvin mere billionths of a degree above absolute zero, using advanced laser cooling and magnetic trapping techniques. At this ultra-cold temperature, the atoms lost their individual identities and collapsed into a single quantum state, behaving like one giant super-atom.

Later that same year, Wolfgang Ketterle at MIT produced a larger and more visible condensate, allowing for deeper exploration of its properties. The creation of BEC not only confirmed a 70-year-old theoretical prediction but also opened new frontiers in quantum mechanics, leading to Nobel Prizes for Cornell, Wieman, and Ketterle in 2001 and revolutionizing research in superfluidity, quantum computing, and atomic physics.

Bose didn't earn a formal doctorate during his stay. Yet, his work was so respected that he was offered positions and honours without needing one.

Bose also investigated on electromagnetic behaviour that can be found in Ionosphere (a layer that spans from about 30 km to 600 km above Earth's surface, and is filled with charged particles). Bose studied how electromagnetic waves behave when they encounter the ionosphere. He explored the phenomenon of total reflection, which is essential for doing

Long - distance radio communications and messages. His work indirectly supported the development of models to predict ionospheric disturbances caused by solar activity, which affect GPS and satellite signals today.

In fact, Bose's theoretical work on the ionosphere was indirectly useful in wartime communications especially during World War II and the Cold War era though he himself wasn't directly involved in military operations.

Other than that Bose did many other small works such as his work on thermodynamics where Bose's idea of treating all particles indistinguishable laid the ground work for quantum statics. He proved that Planck's radiation could be derived by using his new method. Other than that he observed and explored how crystals form and gave their mathematical description (mineralogy), Bose was also intrigued about biological system and their physical models (Biology)

And finally, he studied different molecular structures and various chemical bondings.

LEGACY

"Satyendra Nath Bose's legacy lives on through every boson that shapes our universe, every quantum equation that bears his insight, and every student inspired by his brilliance. Though he's gone, his impact pulses through the heart of modern physics forever etched into science itself." Bose's legacy was also engraved on several structures like S.N. Bose National Centre for Basic Sciences is a research centre near salt lake in Kolkata which is name

After Bose's everlasting legacy; Satyendra Nath Bose Astronomical Observatory (Purulia, West Bengal) is also one of East India's first astronomical named after the legend and most importantly the "22 Ishwar Mill Lane" which Bose called home during most of his scientific career is now made into a world heritage site and gets a lot of visits from scholars and admirers of his work. Siilar to house of Einstein in Bern or Newton's birthplace in Woolsthorpe.

To honour his work, Indian Post launched a stamp of Satyendra Nath Bose on 1st of January 1994 on the occasion of his birthday more than 600,000 stamps were made in security printing press Nashik in a purple - brown color. It could be bought for 1rs and is highly valued among stamp collectors all around the globe. It was based on theme of celebrating his contributions to theoretical physics particular Bose - Einstein statics.

Not only that but he was also awarded with the second-highest civilian reward the prestigious, 'Padma Vibhushan' in 1954 by Dr. Rajendra Prasad.

Just four later he was selected as a Fellow Of The Royal Society (FRS), a prestigious recognition awarded by the United Kingdom's national academy of sciences. Being named an FRS placed him among the ranks of the worlds most distinguished scientists.

While even these awards are humongous and are greatly honoured the feeling that truly warmed and touched Bose's

Heart was that when Paul Dirac made a major contribution and generalized the framework he coined the term used for particles as a 'boson' to honour Bose's hardwork and dedication.

While all these are positive the real twist is that Bose was selected for the illustrious Nobel Prize 11 times in 1956, 1959, 1962, (twice), 1968, 1969, 1970, 1971 (three times), and in 1972. But unfortunately was never ever awarded one.

LIFE OUTSIDE SCIENCE

Beyond his groundbreaking contributions to physics, Satyendra Nath Bose led a remarkably rich and multidimensional life that reflected his deep engagement with culture, education, and public service. A passionate lover of music, he played the esraj and enjoyed singing, often immersing himself in the rhythms of Indian classical traditions.

In fact because of his groundbreaking discoveries and works he was nominated by the President of India (which was Dr. Rajendra Prasad at the time) himself to Parliament which was considered one of the highest civilian recognitions. He served for almost 8 years in the Indian Parliament from 3 April 1952 to 2 April 1960. Though he wasn't a minister, his presence in the Rajya Sabha gave science a seat at the table. He could influence policy discussions, advocate for education.

Even within his family all the descendents and family members close or far, show great respect to Satyendra Nath's forever cherished memory. They continued to live in Kolkata and other parts of India, and they've quietly honoured his legacy through personal remembrance and participation in commemorative events. For example, family members have occasionally attended memorial lectures or exhibitions held in his honour, especially at institutions like the S.N. Bose National Centre for Basic Sciences in Kolkata.

These events often feature tributes from scientists, educators, and sometimes relatives who share anecdotes or reflections about his life. In essence, while his children didn't become public custodians of his legacy, they've preserved it in quieter, more personal ways through family stories, participation in commemorations, and pride in his enduring impact on science and education.